PB-243 904

# LAKE MINNETONKA, HENNEPIN COUNTY, MINNESOTA

Pacific Northwest Environmental Research Laboratory

Prepared for:

National Environmental Research Center
National Environmental Research Center
Minnesota Pollution Control Agency
Minnesota National Guard

July 1975

DISTRIBUTED BY:

NTIS
National Technical Information Service
U. S. DEPARTMENT OF COMMERCE

24

PB243904

# U.S. ENVIRONMENTAL PROTECTION AGENCY
# NATIONAL EUTROPHICATION SURVEY

## WORKING PAPER SERIES

## PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY

An Associate Laboratory of the

NATIONAL ENVIRONMENTAL RESEARCH CENTER - CORVALLIS, OREGON

and

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS, NEVADA

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. Department of Commerce
Springfield, VA. 22151

☆ GPO—697-032

35

TECHNICAL REPORT DATA
*(Please read Instructions on the reverse before completing)*

| 1. REPORT NO. | 2. | 3. PB 243 904 |
|---|---|---|
| 4. TITLE AND SUBTITLE<br>Report on Lake Minnetonka, Hennepin County, Minnesota | | 5. REPORT DATE<br>Prepared July 1975<br>6. PERFORMING ORGANIZATION CODE |
| 7. AUTHOR(S)<br>Anonymous (National Eutrophication Survey Staff) | | 8. PERFORMING ORGANIZATION REPORT NO.<br>Working Paper # 142 |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS<br>National Eutrophication Survey<br>U.S. Environmental Protection Agency<br>200 S. W. 35th St.<br>Corvallis, Oregon 97330 | | 10. PROGRAM ELEMENT NO.<br>11. CONTRACT/GRANT NO. |
| 12. SPONSORING AGENCY NAME AND ADDRESS<br>Office of Research and Development<br>U.S. Environmental Protection Agency<br>401 M Street, S. W.<br>Washington, DC 20460 | | 13. TYPE OF REPORT AND PERIOD COVERED<br>Final - 1972<br>14. SPONSORING AGENCY CODE |

15. SUPPLEMENTARY NOTES
Prepared in cooperation with the U.S. Environmental Protection Agency, National Environmental Research Center, Las Vegas, Nevada 89114

16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

| a. DESCRIPTORS | b. IDENTIFIERS/OPEN ENDED TERMS | c. COSATI Field/Group |
|---|---|---|
| eutrophication<br>lakes<br>nutrients<br>phosphorus<br>nitrogen<br>loading | | 05B<br>05C |

PRICES SUBJECT TO CHANGE

| 18. DISTRIBUTION STATEMENT | 19. SECURITY CLASS (This Report) | 21. NO. OF PAGES |
|---|---|---|
| Release unlimited | | 35 |
| | 20. SECURITY CLASS (This page) | 22. PRICE |
| | | 3.75 - 225 |

EPA Form 2220-1 (9-73)

230042

# REPORT
# ON
# LAKE MINNETONKA
# HENNEPIN COUNTY
# MINNESOTA
# EPA REGION V
# WORKING PAPER No. 142

WITH THE COOPERATION OF THE
MINNESOTA POLLUTION CONTROL AGENCY
AND THE
MINNESOTA NATIONAL GUARD
JULY, 1975

CONTENTS


| | Page |
|---|---|
| Foreword | ii |
| List of Minnesota Study Lakes | iv, v |
| Lake and Drainage Area Map | vi |
| Sections | |
| I. Introduction | 1 |
| II. Conclusions | 1 |
| III. Lake Characteristics | 3 |
| IV. Lake Water Quality Summary | 4 |
| V. Algal Assay | 8 |
| VI. Waste Sources | 10 |
| VII. Literature Reviewed | 11 |
| VIII. Appendices | 12 |

# F O R E W O R D

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

## OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

## ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

## LAKE ANALYSIS*

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

---

* The lake discussed in this report was included in the National Eutrophication Survey as a water body of interest to the Minnesota Pollution Control Agency. Tributaries were not sampled, and this report relates only to the data obtained from lake sampling.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Minnesota Pollution Control Agency for professional involvement and to the Minnesota National Guard for conducting the tributary sampling phase of the Survey.

Grant J. Merritt, Director of the Minnesota Pollution Control Agency, John F. McGuire, Chief, and Joel G. Schilling, Biologist, of the Section of Surface and Groundwater, Division of Water Quality, provided invaluable lake documentation and counsel during the course of the Survey; and the staff of the Section of Municipal Works, Division of Water Quality, were most helpful in identifying point sources and soliciting municipal participation in the Survey.

Major General Chester J. Moeglein, the Adjutant General of Minnesota, and Project Officer Major Adrian Beltrand, who directed the volunteer efforts of the Minnesota National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

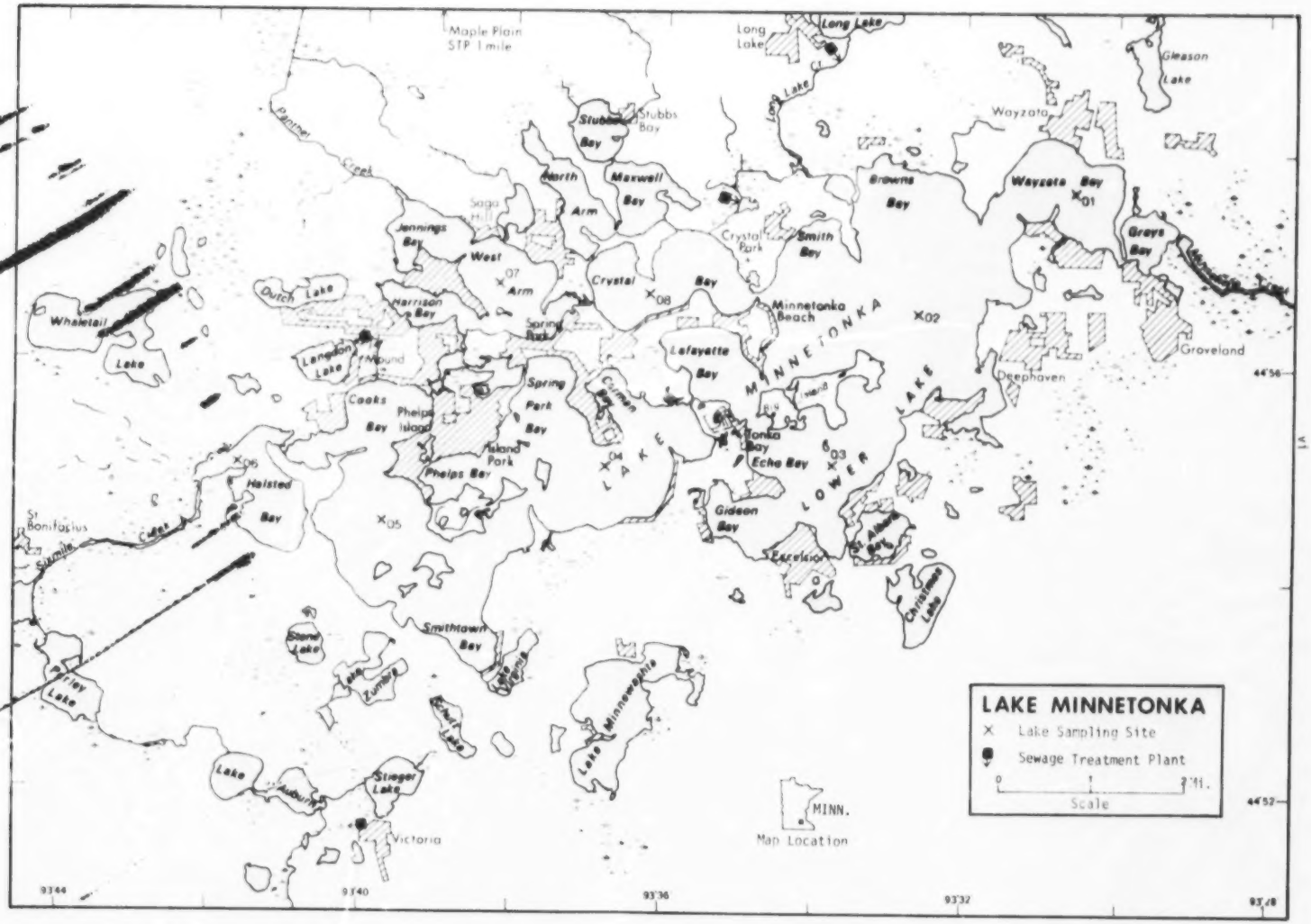
# NATIONAL EUTROPHICATION SURVEY

## STUDY LAKES

## STATE OF MINNESOTA

| LAKE NAME | COUNTY |
|---|---|
| Albert Lea | Freeborn |
| Andrusia | Beltrami |
| Badger | Polk |
| Bartlett | Koochiching |
| Bear | Freeborn |
| Bemidji | Beltrami |
| Big | Stearns |
| Big Stone | Big Stone, MN; Roberts, Grant, SD |
| Birch | Cass |
| Blackduck | Beltrami |
| Blackhoof | Crow Wing |
| Budd | Martin |
| Buffalo | Wright |
| Calhoun | Hennepin |
| Carlos | Douglas |
| Carrigan | Wright |
| Cass | Beltrami, Cass |
| Clearwater | Wright, Stearns |
| Cokato | Wright |
| Cranberry | Crow Wing |
| Darling | Douglas |
| Elbow | St. Louis |
| Embarass | St. Louis |
| Fall | Lake |
| Forest | Washington |
| Green | Kandiyohi |
| Gull | Cass |
| Heron | Jackson |
| Leech | Cass |
| Le Homme Dieu | Douglas |
| Lily | Blue Earth |
| Little | Grant |
| Lost | St. Louis |

| LAKE NAME | COUNTY |
|---|---|
| Madison | Blue Earth |
| Malmedal | Pope |
| Mashkenode | St. Louis |
| McQuade | St. Louis |
| Minnetonka | Hennepin |
| Minnewaska | Pope |
| Mud | Itasca |
| Nest | Kandiyohi |
| Pelican | St. Louis |
| Pepin | Goodhue, Wabasha, MN; Pierce, Pepin, WI |
| Rabbit | Crow Wing |
| Sakatah | Le Sueur |
| Shagawa | St. Louis |
| Silver | McLeod |
| Six Mile | St. Louis |
| Spring | Washington, Dakota |
| St. Croix | Washington, MN; St. Croix, Pierce, WI |
| St. Louis Bay | St. Louis, MN; Douglas, WI |
| Superior Bay | St. Louis, MN; Douglas, WI |
| Swan | Itasca |
| Trace | Todd |
| Trout | Itasca |
| Wagonga | Kandiyohi |
| Wallmark | Chisago |
| White Bear | Washington |
| Winona | Douglas |
| Wolf | Beltrami, Hubbard |
| Woodcock | Kandiyohi |
| Zumbro | Olmstead, Wabasha |


Maple Plain
STP 1 mile
Long Lake
Long Lake
Gleason Lake
Wayzata
Stubbs Bay
Stubbs Bay
Panther Creek
North Arm
Maxwell Bay
Browns Bay
Wayzata Bay
Saga Hill
Jennings Bay
West Arm
Crystal Park
Smith Bay
Crystal Bay
Grays Bay
Dutch Lake
Harrison Bay
Minnetonka Beach
Whaletail Lake
Spring Park
Lafayette Bay
Groveland
Langdon Lake
Mound
Deephaven
Spring Park Bay
Cooks Bay
Phelps Island
Island Park
Phelps Bay
Carmen Bay
Tonka Bay
Echo Bay
Halsted Bay
Gideon Bay
Excelsior
St Bonifacius
Smithtown Bay
Christmas Lake
Shorewood
Lake Minnewashta
Lake Auburn
Stieger Lake
Victoria
MINNETONKA
LAKE
LOWER
LAKE
Map Location
MINN.
LAKE MINNETONKA
Lake Sampling Site
Sewage Treatment Plant
Scale
44°56
44°52
93°44
93°40
93°36
93°32
93°28

LAKE MINNETONKA

STORET NO. 2760

## I. INTRODUCTION

Lake Minnetonka was included in the National Eutrophication Survey as a water body of interest to the Minnesota Pollution Control Agency. Tributaries were not sampled; and although the communities of Long Lake, Maple Plain, Mound, and Orono provided monthly wastewater treatment plant samples and flow data, other nutrient sources were not evaluated. Therefore, this report primarily relates to the lake sampling data.

Several comprehensive studies of Lake Minnetonka have been done (Megard, 1970, 1972; Sorensen, 1970, 1971) and provide detailed information on the lake.

## II. CONCLUSIONS

### A. Trophic condition:

Survey data and the reports indicated above show that Lake Minnetonka is eutrophic. Of the 60 Minnesota lakes sampled in the fall of 1972 when essentially all were well-mixed, 34 had less mean total phosphorus, 32 had less mean dissolved phosphorus, and 40 had less mean inorganic nitrogen. For all samplings of the 60 lakes, 37 had less mean chlorophyll a, and 29 had greater mean Secchi disc transparency. Hypolimnetic dissolved oxygen was markedly depressed or depleted at all of the deeper sampling stations in June and September.

Blue-green algae were dominant in all phytoplankton samples, and problem algal blooms and rooted aquatic vegetation have been reported (Ketelle and Uttormark, 1971).

B. Rate-Limiting Nutrient:

The algal assay results indicate Lake Minnetonka was phosphorus limited at the time the sample was taken (10/30/72). The lake data indicate phosphorus limitation in September as well but nitrogen limitation in June.

C. Point-Source Nutrient Contributions:

Reportedly, six municipal wastewater treatment plants contributed nutrients to Lake Minnetonka during the Survey sampling year (Megard, 1972). Of these, four provided effluent samples and flow data (Appendix B), and the calculated annual nutrient loads contributed by these plants are tabulated below.

| Community | Total P (lbs) | Total N (lbs) |
|---|---|---|
| Long Lake | 2,470 | 6,750 |
| Maple Plain | 4,010 | 5,030 |
| Mound | 35,510 | 99,620 |
| Orono | 2,320 | 5,460 |

## III. LAKE CHARACTERISTICS

### A. Morphometry*:

1. Surface area: 14,475 acres.
2. Mean depth: 22.5 feet.
3. Maximum depth: 91 feet.
4. Volume: 325,690 acre-feet.

### B. Precipitation**:

1. Year of sampling: 24.3 inches.
2. Mean annual: 28.8 inches.

---

* Megard, 1972.
** See Working Paper No. 1, "Survey Methods, 1972".

## IV. LAKE WATER QUALITY SUMMARY

Lake Minnetonka was sampled three times during the open-water season of 1972 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from eight stations on the lake and from a number of depths at each station (see map, page vi). During each visit, a single depth-integrated (15 feet to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the last visit, two five-gallon depth-integrated samples were composited for algal assays (stations 1, 6, 7, and 8 were combined, and stations 2, 3, 4, and 5 were combined). Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll *a* analysis. The maximum depths sampled were 33 feet at station 1, 45 feet at station 2, 22 feet at station 3, 40 feet at station 4, 53 feet at station 5, 19 feet at station 6, 28 feet at station 7, and 65 feet at station 8.

The results obtained are presented in full in Appendix A, and the data for the fall sampling period, when the lake essentially was well-mixed, are summarized in the following table. Note, however, the Secchi disc summary is based on all values.

For differences in the various parameters at the other sampling times, refer to Appendix A.

A. Physical and chemical characteristics:

FALL VALUES

(10/30/72)

| Parameter | Minimum | Mean | Median | Maximum |
|---|---|---|---|---|
| Temperature (Cent.) | 6.2 | 7.1 | 7.3 | 7.8 |
| Dissolved oxygen (mg/l) | 5.0 | 9.6 | 10.2 | 11.6 |
| Conductivity (μmhos) | 320 | 367 | 370 | 400 |
| pH (units) | 7.3 | 7.8 | 7.9 | 8.1 |
| Alkalinity (mg/l) | 126 | 132 | 132 | 137 |
| Total P (mg/l) | 0.026 | 0.065 | 0.056 | 0.143 |
| Dissolved P (mg/l) | 0.011 | 0.028 | 0.021 | 0.054 |
| $NO_2$ + $NO_3$ (mg/l) | 0.020 | 0.063 | 0.050 | 0.190 |
| Ammonia (mg/l) | 0.060 | 0.345 | 0.370 | 0.920 |
| | | ALL VALUES | | |
| Secchi disc (inches) | 26 | 54 | 57 | 74 |

B. Biological characteristics:

1. Phytoplankton -

| Sampling Date | Dominant Genera | Number per ml |
|---|---|---|
| 06/29/72 | 1. Microcystis | 2,767 |
| | 2. Anabaena | 1,356 |
| | 3. Dinobryon | 380 |
| | 4. Chroococcus | 362 |
| | 5. Flagellates | 289 |
| | Other genera | 651 |
| | Total | 5,805 |
| 09/05/72 | 1. Anabaena | 1,844 |
| | 2. Microcystis | 741 |
| | 3. Dictyosphaerium | 271 |
| | 4. Coelosphaerium | 271 |
| | 5. Melosira | 217 |
| | Other genera | 833 |
| | Total | 4,177 |
| 10/29/72 | 1. Anabaena | 1,962 |
| | 2. Dinobryon | 1,358 |
| | 3. Melosira | 528 |
| | 4. Fragilaria | 453 |
| | 5. Scenedesmus | 415 |
| | Other genera | 1,208 |
| | Total | 5,924 |

2. Chlorophyll *a* -
(Because of instrumentation problems during the 1972 sampling, the following values may be in error by plus or minus 20 percent.)

| Sampling Date | Station Number | Chlorophyll *a* (µg/l) |
|---|---|---|
| 06/29/72 | 01 | 26.3 |
| | 02 | 12.7 |
| | 03 | 12.6 |
| | 04 | 14.7 |
| | 05 | 15.0 |
| | 06 | 13.3 |
| | 07 | 12.8 |
| | 08 | 9.5 |
| 09/05/72 | 01 | 11.0 |
| | 02 | 11.8 |
| | 03 | 12.3 |
| | 04 | 8.2 |
| | 05 | 14.2 |
| | 06 | 14.1 |
| | 07 | 24.9 |
| | 08 | 9.1 |
| 10/29-30/72 | 01 | 27.1 |
| | 02 | 14.9 |
| | 03 | 16.5 |
| | 04 | 14.1 |
| | 05 | 17.4 |
| | 06 | 28.8 |
| | 07 | 48.5 |
| | 08 | 8.1 |

## V. ALGAL ASSAY

### A. Limiting Nutrient Study:

#### 1. Autoclaved, filtered, and nutrient spiked -

a. Stations 1, 6, 7, and 8 -

| Spike (mg/l) | Ortho P Conc. (mg/l) | Inorganic N Conc. (mg/l) | Maximum yield (mg/l-dry wt.) |
|---|---|---|---|
| Control | 0.023 | 0.403 | 2.1 |
| 0.006 P | 0.029 | 0.403 | 5.2 |
| 0.012 P | 0.033 | 0.403 | 6.3 |
| 0.024 P | 0.047 | 0.403 | 11.6 |
| 0.060 P | 0.083 | 0.403 | 11.1 |
| 0.060 P + 10.0 N | 0.083 | 10.403 | 6.6 |
| 10.0 N | 0.023 | 10.403 | 2.0 |

b. Stations 2, 3, 4, and 5 -

| Spike (mg/l) | Ortho P Conc. (mg/l) | Inorganic N Conc. (mg/l) | Maximum yield (mg/l-dry wt.) |
|---|---|---|---|
| Control | 0.022 | 0.332 | 0.4 |
| 0.006 P | 0.028 | 0.332 | 5.2 |
| 0.012 P | 0.034 | 0.332 | 5.2 |
| 0.024 P | 0.046 | 0.332 | 12.9 |
| 0.060 P | 0.082 | 0.332 | 14.5 |
| 0.060 P + 10.0 N | 0.082 | 10.332 | 33.7 |
| 10.0 N | 0.082 | 10.332 | 2.5 |

#### 2. Discussion -

The control yields of the autoclaved, filtered assays with Selenastrum capricornutum, indicate that the potential primary productivity of Lake Minnetonka was relatively moderate at the time of the autumn sample collection. The results of the algal assays suggest that phosphorus was the limiting nutrient in the

sample. Increasing phosphorus spikes to about 0.047 mg/l, increased maximum yields in both algal assays. No growth response accompanied spikes of nitrogen alone, nor did the expected yield increase with the simultaneous addition of phosphorus and nitrogen occur in the first sample.

Phosphorus limitation is not inconsistent with the fall field samples which had a 14 to 1 ratio of inorganic nitrogen to dissolved phosphorus.

## VI. WASTE SOURCES

A. Known municipal* -

| Name | Pop. Served | Treatment | Mean Flow (mgd) | Receiving Water |
|---|---|---|---|---|
| Long Lake | 1,506 | trickling filter | 0.158 | Long Lake Creek |
| Maple Plain | 1,169 | act. sludge + pond | 0.220 | Painter Creek |
| Mound** | 7,572 | act. sludge + pond | 1.287 | Lake Langdon |
| Orono | 6,787 | act. sludge + pond | 0.274 | French Lake |

B. Industrial - Unknown

* Anonymous, 1974.

** Connected to the Metropolitan Sewer Board Blue Lake wastewater treatment plant in 1974; plant discharges to the Minnesota River (Anonymous, 1974).

## VII. LITERATURE REVIEWED

Anonymous, 1974. Wastewater disposal facilities inventory. MPCA, Minneapolis.

Ketelle, Martha J., and Paul D. Uttormark, 1971. Problem lakes in the United States. EPA Water Poll. Contr. Res. Ser., Proj. 16010 EHR.

Megard, Robert O., 1970. Lake Minnetonka: nutrients, nutrient abatement, and the photosynthetic system of the phytoplankton. Interim Rept. 7, U. of Minn. Limnol. Res. Ctr., Minneapolis.

_____, 1972. Phytoplankton, photosynthesis, and phosphorus in Lake Minnetonka, Minnesota. Limnol. & Oceanogr., vol. 17, pp. 68-87.

Sorensen, Kenneth E., 1970. Lake Minnetonka comprehensive study; interim report. Harza Engr. Co., Chicago, for MPCA, Minneapolis.

_____, 1971. A program for preserving the quality of Lake Minnetonka. Rept. for MPCA, Minneapolis.

## VIII. APPENDICES

## APPENDIX A

## PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 74/10/30

276001
44 57 42.0 093 30 36.0
LAKE MINNETONKA
27 MINNESOTA

11EPALES
3

2111202
002A FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00610 NH3-N TOTAL MG/L | 00665 PHOS-TOT MG/L P | 00666 PHOS-DIS MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72/06/29 | 15 | 35 0000 | 22.5 | 11.0 | 68 | 335 | 8.40 | 119 | 0.060 | 0.050 | 0.020 | 0.014 |
| | 15 | 35 0015 | 19.5 | | | 340 | 8.30 | 122 | 0.070 | 0.060 | 0.032 | 0.018 |
| | 15 | 35 0025 | 13.0 | 1.2 | | 350 | 7.30 | 134 | 0.100 | 0.150 | 0.032 | 0.020 |
| 72/09/05 | 12 | 25 0000 | | | 72 | 330 | 8.35 | 114 | 0.050 | 0.060 | 0.024 | 0.010 |
| | 12 | 25 0004 | 20.6 | 8.2 | | 320 | 8.45 | 115 | 0.050 | 0.070 | 0.027 | 0.015 |
| | 12 | 25 0015 | 20.4 | 7.5 | | 370 | 8.40 | 116 | 0.060 | 0.080 | 0.022 | 0.011 |
| | 12 | 25 0024 | 20.3 | 7.2 | | 340 | 8.50 | 119 | 0.060 | 0.100 | 0.022 | 0.012 |
| 72/10/30 | 09 | 35 0000 | | | 60 | 380 | 7.90 | 126 | 0.030 | 0.120 | 0.042 | 0.015 |
| | 09 | 35 0004 | 7.3 | 10.2 | | 380 | 7.90 | 129 | 0.030 | 0.120 | 0.038 | 0.011 |
| | 09 | 35 0015 | 7.3 | 10.2 | | 370 | 7.90 | 126 | 0.020 | 0.120 | 0.043 | 0.013 |
| | 09 | 35 0022 | 7.5 | 10.2 | | 360 | 7.90 | 127 | 0.030 | 0.130 | 0.042 | 0.012 |
| | 09 | 35 0033 | 7.4 | 10.2 | | 370 | 7.90 | 128 | 0.030 | 0.130 | 0.040 | 0.013 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 32217 CHLRPHYL A UG/L |
|---|---|---|---|
| 72/06/29 | 15 | 35 0000 | 26.3J |
| 72/09/05 | 12 | 25 0000 | 11.0J |
| 72/10/30 | 09 | 35 0000 | 27.1J |

J VALUE KNOWN TO BE IN ERROR

13

STORET RETRIEVAL DATE 74/10/30

276002
44 56 25.0 093 33 36.0
LAKE MINNETONKA
27 MINNESOTA

11EPALES 2111202
3 0044 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00610 NH3-N TOTAL MG/L | 00665 PHOS-TOT MG/L P | 00666 PHOS-DIS MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72/06/29 | 16 | 05 0000 | 22.0 | | 74 | 350 | 8.50 | 121 | 0.070 | 0.060 | 0.043 | 0.016 |
| | 16 | 05 0010 | 22.0 | | | 350 | 8.40 | 122 | 0.050 | 0.040 | 0.034 | 0.014 |
| | 16 | 05 0020 | 18.5 | | | 370 | 8.10 | 127 | 0.050 | 0.030 | 0.024 | 0.012 |
| | 16 | 05 0040 | 8.5 | 1.8 | | 385 | 7.20 | 137 | 0.240 | 0.340 | 0.081 | 0.068 |
| 72/09/05 | 13 | 00 0000 | | | 67 | 360 | 8.55 | 113 | 0.050 | 0.070 | 0.026 | 0.01[illegible] |
| | 13 | 00 0004 | 20.4 | 8.8 | | 350 | 8.60 | 114 | 0.050 | 0.070 | 0.028 | 0.014 |
| | 13 | 00 0015 | 20.1 | 7.9 | | 340 | 8.45 | 115 | 0.050 | 0.060 | 0.021 | 0.012 |
| | 13 | 00 0020 | 20.1 | 6.6 | | 325 | 8.35 | 113 | 0.060 | 0.070 | 0.031 | 0.014 |
| | 13 | 00 0028 | 19.4 | 7.5 | | 370 | 7.40 | 115 | 0.060 | 0.090 | 0.023 | 0.016 |
| | 13 | 00 0034 | 12.2 | 0.0 | | 370 | 7.43 | 134 | 0.120 | 0.780 | 0.109 | 0.069 |
| 72/10/29 | 16 | 20 0000 | | | 52 | 390 | 7.90 | 130 | 0.040 | 0.220 | 0.050 | 0.019 |
| | 16 | 20 0004 | 7.7 | 10.4 | | 385 | 7.80 | 130 | 0.040 | 0.230 | 0.050 | 0.018 |
| | 16 | 20 0015 | 7.8 | 10.4 | | 370 | 7.90 | 130 | 0.040 | 0.220 | 0.054 | 0.021 |
| | 16 | 20 0022 | 7.8 | 10.4 | | 380 | 7.90 | 131 | 0.050 | 0.230 | 0.047 | 0.020 |
| | 16 | 20 0035 | 7.8 | 10.3 | | 370 | 7.90 | 129 | 0.050 | 0.220 | 0.056 | 0.019 |
| | 16 | 20 0045 | 7.7 | 9.9 | | 370 | 7.90 | 128 | 0.060 | 0.240 | 0.046 | 0.016 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 32217 CHLRPHYL A UG/L |
|---|---|---|---|
| 72/06/29 | 16 | 05 0000 | 12.7J |
| 72/09/05 | 13 | 00 0000 | 11.8J |
| 72/10/29 | 16 | 20 0000 | 14.9J |



J VALUE KNOWN TO BE IN ERROR

STORET RETRIEVAL DATE 74/10/30

276003
44 54 50.0 093 33 57.0
LAKE MINNETONKA
27 MINNESOTA

11EPALES 2111202
3 0022 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00610 NH3-N TOTAL MG/L | 00665 PHOS-TOT MG/L P | 00666 PHOS-DIS MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72/06/29 | 16 30 | 0000 | 24.0 | | 74 | 350 | 8.40 | 122 | 0.100 | 0.060 | 0.025 | 0.014 |
| | 16 30 | 0020 | 18.5 | 5.8 | | 360 | 8.00 | 129 | 0.080 | 0.060 | 0.032 | 0.013 |
| 72/09/05 | 13 35 | 0000 | | | 63 | 325 | 8.50 | 118 | 0.060 | 0.070 | 0.030 | 0.013 |
| | 13 35 | 0004 | 20.3 | 6.4 | | 455 | 8.50 | 115 | 0.050 | 0.060 | 0.032 | 0.013 |
| | 13 35 | 0015 | 20.0 | 7.2 | | 325 | 8.35 | 114 | 0.050 | 0.070 | 0.025 | 0.011 |
| | 13 35 | 0018 | 20.0 | 7.4 | | 360 | 8.35 | 115 | 0.040 | 0.070 | 0.042 | 0.011 |
| 72/10/29 | 16 05 | 0000 | | | 60 | 380 | 7.90 | 131 | 0.040 | 0.160 | 0.048 | 0.011 |
| | 16 05 | 0004 | 7.4 | 10.6 | | 400 | 8.00 | 128 | 0.060 | 0.170 | 0.054 | 0.014 |
| | 16 05 | 0015 | 7.4 | 10.4 | | 400 | 8.00 | 132 | 0.040 | 0.160 | 0.047 | 0.015 |
| | 16 05 | 0022 | 7.4 | 10.5 | | 380 | 8.00 | 133 | 0.050 | 0.160 | 0.046 | 0.014 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 32217 CHLRPHYL A UG/L |
|---|---|---|---|
| 72/06/29 | 16 30 | 0000 | 12.5J |
| 72/09/05 | 13 35 | 0000 | 12.3J |
| 72/10/29 | 16 05 | 0000 | 16.5J |

J VALUE KNOWN TO BE IN ERROR

STORET RETRIEVAL DATE 74/10/30

276004
44 54 55.0 093 36 48.0
LAKE MINNETONKA
27 MINNESOTA

11EPALES 2111202
3 0045 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00610 NH3-N TOTAL MG/L | 00665 PHOS-TOT MG/L P | 00666 PHOS-DIS MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72/06/29 | 17 00 | 0000 | 24.0 | | 72 | 340 | 8.30 | 131 | 0.120 | 0.060 | 0.027 | 0.011 |
| | 17 00 | 0020 | 17.0 | | | 360 | 7.70 | 135 | 0.130 | 0.070 | 0.028 | 0.012 |
| | 17 00 | 0040 | 9.0 | 0.0 | | 390 | 7.20 | 148 | 0.060 | 0.900 | 0.216 | 0.068 |
| 72/09/05 | 14 05 | 0000 | | | 72 | 420 | 8.65 | 119 | 0.050 | 0.060 | 0.018 | 0.010 |
| | 14 05 | 0004 | 20.5 | 6.8 | | 398 | 8.70 | 118 | 0.060 | 0.090 | 0.023 | 0.012 |
| | 14 05 | 0015 | 20.3 | 8.1 | | 310 | 8.55 | 117 | 0.060 | 0.070 | 0.026 | 0.015 |
| | 14 05 | 0022 | 20.1 | 6.6 | | 355 | 8.30 | 116 | 0.050 | 0.100 | 0.020 | 0.011 |
| | 14 05 | 0030 | 15.7 | 0.0 | | 360 | 7.40 | 143 | 0.070 | 0.780 | 0.031 | 0.014 |
| | 14 05 | 0036 | 11.7 | 0.0 | | 440 | 7.25 | 158 | 0.130 | 2.190 | 0.245 | 0.035 |
| 72/10/29 | 15 45 | 0000 | | | 60 | 370 | 8.10 | 132 | 0.040 | 0.060 | 0.028 | 0.012 |
| | 15 45 | 0004 | 6.9 | 11.2 | | 380 | 8.10 | 128 | 0.050 | 0.080 | 0.026 | 0.012 |
| | 15 45 | 0015 | 7.0 | 11.2 | | 365 | 8.10 | 128 | 0.040 | 0.070 | 0.030 | 0.012 |
| | 15 45 | 0024 | 7.0 | 11.0 | | 360 | 8.10 | 127 | 0.040 | 0.070 | 0.028 | 0.012 |
| | 15 45 | 0036 | 7.0 | 11.2 | | 380 | 8.10 | 128 | 0.040 | 0.070 | 0.032 | 0.013 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 32217 CHLRPHYL A UG/L |
|---|---|---|---|
| 72/06/29 | 17 00 | 0000 | 14.7J |
| 72/09/05 | 14 05 | 0000 | 8.2J |
| 72/10/29 | 15 45 | 0000 | 14.1J |

J VALUE KNOWN TO BE IN ERROR

STORET RETRIEVAL DATE 74/13/40

276005
44 54 27.0 093 39 54.0
LAKE MINNETONKA
27 MINNESOTA

11EPALES
3

2111202
0025 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00610 NH3-N TOTAL MG/L | 00665 PHOS-TOT MG/L P | 00666 PHOS-DIS MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72/06/29 | 17 20 | 0000 | 23.5 | | 42 | 325 | 8.60 | 122 | 0.200 | 0.080 | 0.034 | 0.015 |
| | 17 20 | 0012 | 21.0 | | | 325 | 8.30 | 118 | 0.060 | 0.070 | 0.027 | 0.014 |
| | 17 20 | 0025 | 13.0 | 0.6 | | 370 | 7.30 | 147 | 0.520 | 0.100 | 0.105 | 0.090 |
| 72/09/05 | 14 45 | 0000 | | | 54 | 420 | 8.80 | 116 | 0.060 | 0.070 | 0.029 | 0.015 |
| | 14 45 | 0004 | 20.2 | 9.5 | | 310 | 8.75 | 114 | 0.060 | 0.080 | 0.031 | 0.017 |
| | 14 45 | 0015 | 19.9 | 7.5 | | 315 | 8.07 | 114 | 0.050 | 0.090 | 0.032 | 0.015 |
| | 14 45 | 0022 | 19.7 | 4.4 | | 370 | 7.75 | 117 | 0.050 | 0.220 | 0.040 | 0.020 |
| | 14 45 | 0030 | 13.6 | 0.0 | | 370 | 7.55 | 140 | 0.160 | 0.930 | 0.181 | 0.120 |
| | 14 45 | 0041 | 8.2 | 0.0 | | 375 | 7.40 | 143 | 0.140 | 0.220 | 0.270 | 0.199 |
| | 14 45 | 0051 | 7.3 | 0.0 | | 385 | 7.30 | 158 | 0.160 | 2.430 | 0.398 | 0.348 |
| 72/10/29 | 15 20 | 0000 | | | 52 | 400 | 7.80 | 131 | 0.070 | 0.440 | 0.106 | 0.048 |
| | 15 20 | 0004 | 7.7 | 9.6 | | 400 | 7.80 | 133 | 0.060 | 0.440 | 0.103 | 0.046 |
| | 15 20 | 0015 | 7.6 | 9.6 | | 400 | 7.80 | 132 | 0.070 | 0.440 | 0.118 | 0.050 |
| | 15 20 | 0022 | 7.6 | 9.6 | | 390 | 7.80 | 133 | 0.070 | 0.450 | 0.108 | 0.050 |
| | 15 20 | 0030 | 7.6 | 9.6 | | 400 | 7.30 | 134 | 0.060 | 0.460 | 0.114 | 0.029 |
| | 15 20 | 0040 | 7.6 | 9.4 | | 380 | 7.70 | 133 | 0.060 | 0.440 | 0.111 | 0.051 |
| | 15 20 | 0053 | 7.5 | 9.1 | | 400 | 7.70 | 133 | 0.070 | 0.460 | 0.118 | 0.054 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 32217 CHLRPHYL A UG/L |
|---|---|---|---|
| 72/06/29 | 17 20 | 0000 | 15.0J |
| 72/09/05 | 14 45 | 0000 | 14.2J |
| 72/10/29 | 15 20 | 0000 | 17.4J |

J VALUE KNOWN TO BE +/- ERROR

-17-

-17-

STORET RETRIEVAL DATE 74/10/30

276006
44 55 03.0 093 41 30.0
LAKE MINNETONKA
27 MINNESOTA

11EPALES 2111202
3 0020 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00610 NH3-N TOTAL MG/L | 00665 PHOS-TOT MG/L P | 00666 PHOS-DIS MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72/06/29 | 17 45 | 0000 | 23.0 | | 26 | 300 | 8.50 | 122 | 0.110 | 0.100 | 0.055 | 0.028 |
| | 17 45 | 0015 | 19.0 | 0.4 | | 350 | 7.50 | 150 | 0.050 | 0.470 | 0.085 | 0.069 |
| 72/09/05 | 15 25 | 0000 | | | 35 | 335 | 8.00 | 127 | 0.070 | 0.240 | 0.111 | 0.027 |
| | 15 25 | 0004 | 20.2 | 5.5 | | 285 | 8.00 | 126 | 0.080 | 0.250 | 0.080 | 0.027 |
| | 15 25 | 0015 | 19.9 | 4.2 | | 300 | 7.75 | 128 | 0.070 | 0.340 | 0.099 | 0.035 |
| | 15 25 | 0019 | 19.9 | 4.2 | | 295 | 7.80 | 127 | 0.070 | 0.320 | 0.099 | 0.030 |
| 72/10/30 | 07 35 | 0000 | | | 48 | 340 | 7.60 | 133 | 0.170 | 0.910 | 0.073 | 0.037 |
| | 07 35 | 0004 | 6.4 | 9.0 | | 330 | 7.60 | 132 | 0.170 | 0.920 | 0.067 | 0.037 |
| | 07 35 | 0012 | 6.4 | 9.0 | | 320 | 7.50 | 134 | 0.180 | 0.910 | 0.081 | 0.039 |
| | 07 35 | 0018 | 6.4 | 8.9 | | 320 | 7.50 | 134 | 0.190 | 0.920 | 0.087 | 0.042 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 32217 CHLRPHYL A UG/L |
|---|---|---|---|
| 72/06/29 | 17 45 | 0000 | 13.3J |
| 72/09/05 | 15 25 | 0000 | 14.1J |
| 72/10/30 | 07 35 | 0000 | 28.8J |

J VALUE KNOWN TO BE IN ERROR



-18-

STORET RETRIEVAL DATE 74/10/30

276007
44 56 45.0 093 38 12.0
LAKE MINNETONKA
27 MINNESOTA

11EPALES
3

2111202
0024 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00610 NH3-N TOTAL MG/L | 00665 PHOS-TOT MG/L P | 00666 PHOS-DIS MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72/06/29 | 18 05 | 0000 | 24.0 | | 40 | 350 | 8.50 | 136 | 0.060 | 0.050 | 0.039 | 0.019 |
| | 18 05 | 0020 | 16.0 | 1.0 | | 345 | 7.30 | 157 | 0.070 | 0.530 | 0.062 | 0.035 |
| 72/09/05 | 15 50 | 0000 | | | 29 | 325 | 8.65 | 128 | 0.100 | 0.120 | 0.066 | 0.023 |
| | 15 50 | 0004 | 20.4 | 6.6 | | 328 | 8.30 | 131 | 0.080 | 0.120 | 0.058 | 0.027 |
| | 15 50 | 0015 | 19.4 | 5.4 | | 328 | 8.20 | 131 | 0.060 | 0.560 | 0.067 | 0.034 |
| | 15 50 | 0021 | 19.5 | 1.4 | | 440 | 7.05 | 133 | 0.060 | 0.580 | 0.077 | 0.033 |
| | 15 50 | 0028 | 15.2 | 0.0 | | 430 | 7.05 | 198 | 0.170 | 6.300 | 0.665 | 0.449 |
| 72/10/30 | 08 00 | 0000 | | | 30 | 360 | 8.00 | 136 | 0.100 | 0.390 | 0.072 | 0.022 |
| | 08 00 | 0004 | 6.2 | 11.0 | | 340 | 8.00 | 135 | 0.080 | 0.370 | 0.055 | 0.019 |
| | 08 00 | 0015 | 6.2 | 11.0 | | 350 | 8.10 | 135 | 0.080 | 0.360 | 0.070 | 0.022 |
| | 08 00 | 0019 | 6.2 | 11.6 | | 350 | 8.10 | 133 | 0.110 | 0.390 | 0.073 | 0.021 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 32217 CHLRPHYL A UG/L |
|---|---|---|---|
| 72/06/29 | 18 05 | 0000 | 12.8J |
| 72/09/05 | 15 50 | 0000 | 24.8J |
| 72/10/30 | 08 00 | 0000 | 48.5J |

J VALUE KNOWN TO BE IN ERROR

-51-

STORET RETRIEVAL DATE 72/10/30

276008
44 56 36.0 093 36 30.0
LAKE MINNETONKA
27 MINNESOTA

11EPALES
3

2111202
0062 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00010 WATER TEMP CENT | 00300 DO MG/L | 00077 TRANSP SECCHI INCHES | 00094 CNDUCTVY FIELD MICROMHO | 00400 PH SU | 00410 T ALK CACO3 MG/L | 00630 NO2&NO3 N-TOTAL MG/L | 00610 NH3-N TOTAL MG/L | 00665 PHOS-TOT MG/L P | 00666 PHOS-DIS MG/L P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 72/06/29 | 18 | 15 0000 | 23.5 | | 46 | 330 | 8.30 | 117 | 0.070 | 0.060 | 0.025 | 0.013 |
| | 18 | 15 0010 | 22.0 | | | 335 | 8.30 | 121 | 0.060 | 0.070 | 0.032 | 0.014 |
| | 18 | 15 0025 | 7.0 | | | 380 | 7.30 | 147 | 0.210 | 0.120 | 0.025 | 0.016 |
| | 18 | 15 0060 | 5.0 | 0.2 | | 400 | 7.10 | 157 | 0.060 | 1.100 | 0.212 | 0.204 |
| 72/09/05 | 17 | 30 0000 | | | 68 | 325 | 8.70 | | | | | |
| | 17 | 30 0004 | 11.3 | 9.0 | | 323 | 8.70 | | | | | |
| | 17 | 30 0015 | 8.0 | 2.6 | | 400 | 7.50 | | | | | |
| | 17 | 30 0024 | 0.9 | 0.1 | | 380 | 7.55 | 152 | 0.060 | 0.340 | 0.027 | 0.013 |
| 72/10/30 | 08 | 20 0000 | | | 36 | 380 | 7.40 | 136 | 0.040 | 0.430 | 0.061 | 0.040 |
| | 08 | 20 0004 | 6.4 | 8.2 | | 360 | 7.30 | 137 | 0.040 | 0.440 | 0.062 | 0.050 |
| | 08 | 20 0015 | 6.4 | 8.2 | | 340 | 7.30 | 136 | 0.040 | 0.430 | 0.056 | 0.039 |
| | 08 | 20 0025 | 6.4 | 8.0 | | 340 | 7.30 | 135 | 0.040 | 0.430 | 0.062 | 0.041 |
| | 08 | 20 0035 | 6.4 | 7.8 | | 340 | 7.30 | 135 | 0.040 | 0.440 | 0.066 | 0.043 |
| | 08 | 20 0045 | 6.4 | 5.0 | | 350 | 7.30 | 136 | 0.040 | 0.440 | 0.061 | 0.041 |
| | 08 | 20 0055 | 6.4 | 5.0 | | 360 | 7.30 | 135 | 0.040 | 0.430 | 0.062 | 0.042 |
| | 08 | 20 0065 | 6.3 | 7.8 | | 360 | 7.40 | 135 | 0.080 | 0.500 | 0.143 | 0.039 |

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 32217 CHLRPHYL A UG/L |
|---|---|---|---|
| 72/06/29 | 18 | 15 0000 | 9.5J |
| 72/09/05 | 17 | 30 0000 | 9.1J |
| 72/10/30 | 08 | 20 0000 | 8.1J |

J VALUE KNOWN TO BE IN ERROR



-20-

# APPENDIX B

## SEWAGE TREATMENT PLANT DATA

STORET RETRIEVAL DATE 74/10/30

27605 1 45276051 P001169
45 00 00.0 093 39 00.0
MAPLE PLAIN
27019 15 ROCKFORD
T/LAKE MINNETONKA
RICE LAKE
11FPALFS 2141204
4 0000 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00630 NO2&NO3 N-TOTAL MG/L | 00625 TOT KJEL N MG/L | 00610 NH3-N TOTAL MG/L | 00671 PHOS-DIS ORTHO MG/L P | 00665 PHOS-TOT MG/L P | 50051 FLOW RATE INST MGD | 50053 CONDUIT FLOW-MGD MONTHLY |
|---|---|---|---|---|---|---|---|---|---|
| 73/02/24 | 11 | 00 | | | | | | | |
| CP(T)- | | | 5.900 | 2.400 | 0.031 | 4.900 | 6.900 | 0.132 | 0.180 |
| 73/02/24 | 13 | 00 | | | | | | | |
| 73/03/04 | 11 | 00 | | | | | | | |
| CP(T)- | | | 5.900 | 2.340 | 0.037 | 4.000 | 4.000 | 0.248 | 0.238 |
| 73/03/04 | 13 | 00 | | | | | | | |
| 73/04/04 | 11 | 00 | | | | | | | |
| CP(T)- | | | 3.800 | 1.400 | 0.100 | 4.400 | 5.000 | 0.270 | 0.275 |
| 73/04/04 | 13 | 00 | | | | | | | |
| 73/05/03 | 11 | 00 | | | | | | | |
| CP(T)- | | | 3.450 | 2.300 | 0.260 | 4.150 | 4.400 | 0.390 | 0.200 |
| 73/05/03 | 13 | 00 | | | | | | | |
| 73/06/01 | 09 | 00 | | | | | | | |
| CP(T)- | | | 2.030 | 4.300 | 0.174 | 3.990 | 5.100 | 0.250 | 0.274 |
| 73/06/01 | 13 | 00 | | | | | | | |
| 73/07/02 | 11 | 00 | | | | | | | |
| CP(T)- | | | 2.400 | 3.600 | 0.300 | 4.150 | 5.400 | 0.220 | 0.260 |
| 73/07/02 | 13 | 00 | | | | | | | |
| 73/08/07 | 11 | 00 | | | | | | | |
| CP(T)- | | | | | | | | 0.217 | 0.194 |
| 73/08/07 | 13 | 00 | | | | | | | |
| 73/09/05 | 11 | 00 | | | | | | | |
| CP(T)- | | | | 4.000 | | | 7.600 | 0.219 | 0.215 |
| 73/09/05 | 13 | 00 | | | | | | | |
| 73/10/04 | 11 | 00 | | | | | | | |
| CP(T)- | | | 3.350 | 3.700 | 0.110 | 5.400 | 7.200 | 0.218 | 0.210 |
| 73/10/04 | 13 | 00 | | | | | | | |
| 73/11/02 | 11 | 00 | | | | | | | |
| CP(T)- | | | 7.500 | 0.500K | 0.018 | 5.500 | 5.750 | 0.199 | 0.225 |
| 73/11/02 | 13 | 00 | | | | | | | |
| 73/12/03 | 11 | 00 | | | | | | | |
| CP(T)- | | | 2.400 | 1.000 | 0.040K | 4.900 | 5.350 | 0.140 | 0.200 |
| 73/12/03 | 13 | 00 | | | | | | | |
| 74/01/08 | 11 | 00 | | | | | | | |
| CP(T)- | | | 13.600 | 1.000 | 0.080 | 7.200 | 7.200 | 0.171 | 0.175 |
| 74/01/0- | 13 | 00 | | | | | | | |

K VALUE KNOWN TO BE LESS THAN INDICATED

STORET RETRIEVAL DATE 74/10/30

276052 AS276052 P000350
44 57 30.0 095 35 00.0
ORONO
27 15 LK MINNETONKA
T/LAKE MINNETONKA
UNNAMED TRIB
11FPALES 2141204
4 0000 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00630 NO2&NO3 N-TOTAL MG/L | 00625 TOT KJEL N MG/L | 00610 NH3-N TOTAL MG/L | 00671 PHOS-DIS ORTHO MG/L P | 00665 PHOS-TOT MG/L P | 50051 FLOW RATE INST MGD | 50053 CONDUIT FLOW-MGD MONTHLY |
|---|---|---|---|---|---|---|---|---|---|
| 73/02/26 | 11 | 00 | | | | | | | |
| CP(T)- | | | 12.600 | 10.000 | 0.600 | 4.100 | 4.950 | 0.249 | 0.264 |
| 73/02/26 | 13 | 00 | | | | | | | |
| 73/03/06 | 11 | 00 | | | | | | | |
| CP(T)- | | | 5.100 | 6.900 | 0.590 | 2.500 | 2.700 | 0.333 | 0.257 |
| 73/03/06 | 13 | 00 | | | | | | | |
| 73/04/04 | 11 | 00 | 4.300 | 2.400 | 0.039 | 2.000 | 2.200 | 0.301 | 0.392 |
| 73/05/03 | 11 | 00 | 0.515 | 3.000 | 0.390 | 1.260 | 1.400 | 0.365 | 0.327 |
| 73/06/01 | 11 | 00 | | | | | | | |
| CP(T)- | | | 3.656 | 1.600 | 0.126 | 1.141 | 1.200 | 0.312 | 0.308 |
| 73/06/01 | 13 | 00 | | | | | | | |
| 73/07/02 | 11 | 00 | 0.190 | 1.100 | 0.180 | 0.820 | 1.100 | 0.281 | 0.280 |
| 73/09/07 | 11 | 00 | | | | | | | |
| CP(T)- | | | 0.061 | 1.760 | 0.054 | 0.535 | 1.100 | 0.273 | 0.235 |
| 73/09/07 | 13 | 00 | | | | | | | |
| 73/09/05 | 11 | 00 | | | | | | | |
| CP(T)- | | | | 3.400 | | | 3.800 | 0.255 | 0.240 |
| 73/09/05 | 13 | 00 | | | | | | | |
| 73/10/04 | 11 | 00 | | | | | | | |
| CP(T)- | | | 0.247 | 3.000 | 0.075 | 4.700 | 4.800 | 0.250 | 0.225 |
| 73/10/04 | 13 | 00 | | | | | | | |
| 73/11/02 | 11 | 00 | | | | | | | |
| CP(T)- | | | 2.310 | 1.400 | 0.110 | 3.600 | 3.900 | 0.250 | 0.235 |
| 73/11/02 | 13 | 00 | | | | | | | |
| 73/12/03 | 11 | 00 | | | | | | | |
| CP(T)- | | | 3.900 | 1.500 | 0.320 | 3.100 | 3.400 | 0.280 | 0.250 |
| 73/12/03 | 13 | 00 | | | | | | | |

STORET RETRIEVAL DATE- 74/10/30

Reproduced from best available copy.

276053 TF276053 P001506
44 54 00.0 093 33 30.0
LONG LAKE
27 15 LK MINNETONKA
T/LAKE MINNETONKA
LONG LAKE CREEK
11EPALES 2141204
4 0000 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00630 NO3&NO2-N-TOTAL MG/L | 00625 TOT KJEL N MG/L | 00610 NH3-N TOTAL MG/L | 00671 PHOS-DIS ORTHO MG/L P | 00665 PHOS-TOT MG/L P | 50051 FLOW RATE INST MGD | 50053 CONDUIT FLOW-MGD MONTHLY |
|---|---|---|---|---|---|---|---|---|---|
| 73/02/25 | 11 | 00 | | | | | | | |
| CP(T)- | | | 0.040 | 33.600 | 21.000 | 3.000 | 10.250 | 0.122 | 0.153 |
| 73/02/25 | 13 | 00 | | | | | | | |
| 73/03/05 | 11 | 00 | 0.040 | 42.000 | 17.200 | 10.000 | 10.500 | 0.201 | 0.155 |
| 73/04/04 | 11 | 30 | 0.330 | 3.300 | 0.350 | 0.712 | 1.050 | 0.195 | 0.180 |
| 73/05/03 | 11 | 30 | 0.110 | 5.250 | 0.034 | 1.500 | 1.750 | 0.204 | 0.156 |
| 73/06/01 | 11 | 00 | | | | | | | |
| CP(T)- | | | 0.451 | 10.500 | 0.126 | 2.640 | 3.100 | 0.108 | 0.220 |
| 73/06/01 | 13 | 00 | | | | | | | |
| 73/07/02 | 11 | 00 | 0.440 | 7.100 | 0.480 | 1.760 | 2.900 | | 0.150 |
| 73/08/07 | 11 | 00 | | | | | | | |
| CP(T)- | | | 0.190 | 10.000 | 0.240 | 1.540 | 4.200 | 0.134 | 0.150 |
| 73/08/07 | 13 | 00 | | | | | | | |
| 73/09/05 | 11 | 00 | | | | | | | |
| CP(T)- | | | | 13.400 | | | 7.100 | 0.138 | 0.150 |
| 73/09/05 | 13 | 00 | | | | | | | |
| 73/10/04 | 11 | 00 | | | | | | | |
| CP(T)- | | | 0.300 | 11.500 | 0.220 | 3.600 | 4.100 | 0.221 | 0.143 |
| 73/10/04 | 13 | 00 | | | | | | | |
| 73/11/02 | 11 | 00 | | | | | | | |
| CP(T)- | | | 0.500 | 12.500 | 0.030 | 3.400 | 4.500 | 0.125 | 0.120 |
| 73/11/02 | 13 | 00 | | | | | | | |
| 73/12/03 | 11 | 00 | | | | | | | |
| CP(T)- | | | 0.370 | 17.000 | 3.780 | 3.570 | 6.900 | 0.150 | 0.160 |
| 73/12/03 | 13 | 00 | | | | | | | |

STORET RETRIEVAL DATE 74/10/30

276054 AS276054 R007572
44 56 00.0 093 40 00.0
MOUND
27 15 LK MINNETONKA
T/LAKE MINNETONKA
LANGDON LAKE
11EPALES . 2141204
4 0000 FEET DEPTH

| DATE FROM TO | TIME OF DAY | DEPTH FEET | 00630 NO2&NO3 N-TOTAL MG/L | 00625 TOT KJEL N MG/L | 00610 NH3-N TOTAL MG/L | 00671 PHOS-DIS ORTHO MG/L P | 00665 PHOS-TOT MG/L P | 50051 FLOW RATE INST MGD | 50053 CONDUIT FLOW-MGD MONTHLY |
|---|---|---|---|---|---|---|---|---|---|
| 73/02/26 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.020 | 32.000 | 14.700 | 7.800 | 8.150 | 1.100 | 1.120 |
| 73/02/26 | 13 00 | | | | | | | | |
| 73/03/06 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.010K | 25.000 | 12.200 | 7.000 | 7.800 | 1.350 | 1.260 |
| 73/03/06 | 13 00 | | | | | | | | |
| 73/04/04 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.050 | 22.000 | 9.100 | 3.520 | 6.800 | 1.260 | 1.270 |
| 73/04/04 | 13 00 | | | | | | | | |
| 73/05/03 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.050 | 24.000 | 8.300 | 2.915 | 7.700 | 1.370 | 1.310 |
| 73/05/03 | 13 00 | | | | | | | | |
| 73/06/01 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.190 | 24.000 | 9.350 | 6.950 | 8.600 | 1.330 | 1.240 |
| 73/06/01 | 13 00 | | | | | | | | |
| 73/07/02 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.100 | 25.200 | 6.200 | 5.590 | 9.600 | 1.140 | 1.130 |
| 73/07/02 | 13 00 | | | | | | | | |
| 73/08/14 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.020 | 23.000 | 2.000 | 3.000 | 12.500 | 1.190 | 1.120 |
| 73/08/14 | 13 00 | | | | | | | | |
| 73/09/05 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.042 | 24.700 | 4.500 | 6.000 | | 1.270 | 1.220 |
| 73/09/05 | 13 00 | | | | | | | | |
| 73/10/05 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.090 | 31.000 | 7.925 | 2.255 | 9.950 | 1.500 | 1.580 |
| 73/10/05 | 13 00 | | | | | | | | |
| 73/11/02 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.150 | 28.000 | 13.000 | 2.400 | 10.000 | 1.540 | 1.550 |
| 73/11/02 | 13 00 | | | | | | | | |
| 73/12/03 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.140 | 26.000 | 13.000 | 7.600 | 9.100 | 1.240 | 1.250 |
| 73/12/03 | 13 00 | | | | | | | | |
| 74/01/08 | 11 00 | | | | | | | | |
| CP(T)- | | | 0.200 | 19.000 | 13.800 | 9.000 | 9.450 | 1.430 | 1.390 |
| 74/01/08 | 13 00 | | | | | | | | |

K VALUE KNOWN TO BE LESS THAN INDICATED